

PATENT COOPERATION TREATY



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INTERNATIONAL PRELIMINARY EXAMINATION REPORT
(PCT Article 36 and Rule 70)

REC'D 25 OCT 2005

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Applicant's or agent's file reference P10941 PC/P10405		FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/DK2004/000389	International filing date (day/month/year) 07.06.2004	Priority date (day/month/year) 06.06.2003	
International Patent Classification (IPC) or both national classification and IPC H04R25/00, H04L12/28			
Applicant GN RESOUND AS			
<p>1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 5 sheets, including this cover sheet.</p> <p><input type="checkbox"/> This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).</p> <p>These annexes consist of a total of sheets.</p>			
<p>3. This report contains indications relating to the following items:</p> <ul style="list-style-type: none">I <input checked="" type="checkbox"/> Basis of the opinionII <input type="checkbox"/> PriorityIII <input type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicabilityIV <input type="checkbox"/> Lack of unity of inventionV <input checked="" type="checkbox"/> Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statementVI <input type="checkbox"/> Certain documents citedVII <input type="checkbox"/> Certain defects in the international applicationVIII <input type="checkbox"/> Certain observations on the international application			
Date of submission of the demand 06.04.2005		Date of completion of this report 26.10.2005	
Name and mailing address of the international preliminary examining authority:  European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016		Authorized Officer Timms, O Telephone No. +31 70 340-2067 	

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International application No. PCT/DK2004/000389

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, Pages

1-13 as originally filed

Claims, Numbers

1-33 filed with telefax on 04.10.2005

Drawings, Sheets

1/11-11/11 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:
- ☐ the drawings, sheets:

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5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	1-33
	No: Claims	
Inventive step (IS)	Yes: Claims	1-33
	No: Claims	
Industrial applicability (IA)	Yes: Claims	1-33
	No: Claims	

2. Citations and explanations

see separate sheet

Re Item V

**Reasoned statement with regard to novelty, inventive step or industrial applicability;
citations and explanations supporting such statement**

1 Reference is made to the following document:

D1: WO 01/54458 A (STARKEY LAB INC) 26 July 2001 (2001-07-26).

2.1 The document D1 is regarded as being the closest prior art to the subject-matter of claim 1, and shows (the references in parentheses applying to this document):

"A hearing aid comprising: a transceiver for interconnection of the hearing aid with a wireless network (Page 6 L6-10), and a communication controller that is adapted for controlling data exchange through the network in accordance with a network protocol (Page 6 L17-19)".

The subject-matter of claim 1 differs from this known device in that the hearing aid is adapted for connection with a hearing aid wireless network and controlling synchronization of units connected with the network.

The subject-matter of claim 1 is therefore new (Article 33(2) PCT).

2.2 The problem to be solved by the present invention may be regarded as how to reduce power consumption of hearing device connected with a hearing aid wireless network.

The solution to this problem proposed in claim 1 of the present application is considered as involving an inventive step (Article 33(3) PCT) for the following reasons: the applicant is proposing to use hearing aid as a master of the network in a way that it controls synchronisation of units connected with the network (inclusively other hearing devices) thus shortening the communication protocol. This results in a minimization of the time used for reception of data leading to reduction of energy consumption relatively to the systems employing the Bluetooth protocol.

3 Claims 1-17 are dependent on claim 1 and as such also meet the requirements of the PCT with respect to novelty and inventive step.

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- 4 Independent claim 18 includes all essential technical features from claim 1. Therefore the same argumentation regarding novelty and inventive step as in section 2 of the present communication applies also for claim 18.
- 5 Claims 19-33 are dependent on claim 18 and as such also meet the requirements of the PCT with respect to novelty and inventive step.

CLAIMS

1. A hearing aid that is adapted for connection with a hearing aid wireless network and controlling synchronization of units connected with the network, comprising
5 a transceiver for interconnection of the hearing aid with the hearing aid wireless network, and

a communication controller that is adapted for controlling data exchange through the network in accordance with a network protocol, and wherein

the controller is further adapted for initialisation of the network

in an acquisition mode by

10 controlling the transceiver to transmit interrogation data repetitively, and
upon receipt of an interrogation data received message from another device,

in a connected mode

15 acting as a master of the network by repetitively transmitting
synchronization data at intervals that are longer than the intervals
between transmitted interrogation data in the acquisition mode.

2. A hearing aid according to claim 1, wherein the controller is further adapted to act as a slave in the network upon receipt of interrogation data from another hearing aid, the other hearing aid being the master of the network.

20 3. A hearing aid according to claim 1 or 2, wherein the controller, in the acquisition mode, is further adapted to enable the receiver to receive data from the network in certain time periods during which transmission of synchronization data is inhibited.

25 4. A hearing aid according to any of the preceding claims, wherein the controller is further adapted for selective operation of the transceiver in a plurality of frequency channels.

5. A hearing aid according to any of the preceding claims, wherein the controller is further adapted for operation of the transceiver according to a time division multiplex scheme.

30 6. A hearing aid according to claim 4, wherein the controller is further adapted for operation of the transceiver according to a frequency division multiplex scheme.

7. A hearing aid according to any of claims 4-6, wherein the controller is further adapted for operation of the transceiver according to a spread spectrum scheme.
8. A hearing aid according to claim 7, wherein the controller is further adapted for operation of the transceiver according to a frequency hopping scheme.
- 5 9. A hearing aid according to claim 8, wherein a frequency hopping algorithm is provided that allows devices in the network to calculate what frequency channel the network will use at any given point in time without relying on the history of the network.
- 10 10. A hearing aid according to any of the preceding claims, wherein one device in the network is a master device, and all other devices in the network synchronize to the timing of the master device utilising the synchronization data.
11. A hearing aid according to any of the preceding claims, wherein a new device is automatically recognized by the network and interconnected with the network.
12. A hearing aid according to any of the preceding claims, wherein the controller is further adapted for reception of data from devices that do not receive data from the network.
- 15 13. A binaural hearing aid system comprising a first and a second hearing aid according to any of the preceding claims mutually interconnected for data exchange through the network.
14. A remote controller for a hearing aid and adapted to communicate with a hearing aid according to any of claims 1-12 through the wireless network.
- 20 15. A fitting instrument for a hearing aid and adapted to communicate with a hearing aid according to any of claims 1-12 through the wireless network.
16. A mobile phone adapted to communicate with a hearing aid according to any of claims 1-12 through the wireless network.
- 25 17. A broadcast system adapted to communicate with a hearing aid according to any of claims 1-12 through the wireless network.
18. A binaural hearing aid system comprising a first and a second hearing aid that are interconnected for data exchange through a wireless network, and wherein at least one of the first and second hearing aids is adapted for connection with the hearing aid wireless network and controlling synchronization of units connected with the network, and further comprises
- 30 a transceiver for interconnection of the hearing aid with a wireless network, and

a communication controller that is adapted for controlling data exchange through the network in accordance with a network protocol, and wherein

the controller is further adapted for initialisation of the network

in an acquisition mode by

5 controlling the transceiver to transmit interrogation data repetitively, and
 upon receipt of an interrogation data received message from another
 device,

in a connected mode

10 acting as a master of the network by repetitively transmitting
 synchronization data at intervals that are longer than the intervals
 between transmitted interrogation data in the acquisition mode.

19. A binaural hearing aid system according to claim 18, wherein the controller is further adapted to act as a slave in the network upon receipt of interrogation data from another hearing aid, the other hearing aid being the master of the network.

15 20. A binaural hearing aid system according to claim 18 or 19, wherein the controller, in the acquisition mode, is further adapted to enable the receiver to receive data from the network in certain time periods during which transmission of synchronization data is inhibited.

20 21. A binaural hearing aid system according to any of claims 18-20, wherein the controller is further adapted for selective operation of the transceiver in a plurality of frequency channels.

22. A binaural hearing aid system according to any of claims 18-21, wherein the controller is further adapted for operation of the transceiver according to a time division multiplex scheme.

25 23. A binaural hearing aid system according to claim 21, wherein the controller is further adapted for operation of the transceiver according to a frequency division multiplex scheme.

30 24. A binaural hearing aid system according to any of claims 21-23, wherein the controller is further adapted for operation of the transceiver according to a spread spectrum scheme.

25. A binaural hearing aid system according to claim 24, wherein the controller is further adapted for operation of the transceiver according to a frequency hopping scheme.

26. A binaural hearing aid system according to claim 25, wherein a frequency hopping algorithm is provided that allows devices in the network to calculate what frequency channel the network will use at any given point in time without relying on the history of the network.

27. A binaural hearing aid system according to any of claims 18-26, wherein one device in the network is a master device, and all other devices in the network synchronize to the timing of the master device utilising the synchronization data.

28. A binaural hearing aid system according to any of claims 18-27, wherein a new device is automatically recognized by the network and interconnected with the network.

29. A binaural hearing aid system according to any of claims 18-28, wherein the controller is further adapted for reception of data from devices that do not receive data from the network.

30. A remote controller for a binaural hearing aid system and adapted to communicate with a binaural hearing aid system according to any of claims 18-29 through the wireless network.

31. A fitting instrument for a binaural hearing aid system and adapted to communicate with a binaural hearing aid system according to any of claims 18-29 through the wireless network.

32. A mobile phone adapted to communicate with a binaural hearing aid system according to any of claims 18-29 through the wireless network.

33. A broadcast system adapted to communicate with a binaural hearing aid system according to any of claims 18-29 through the wireless network,